PROBABILITY DISTRIBUTION(CO-2)

QUESTION

DISCRETE PROBABILITY DISTRIBUTION

1 Write down the probability distribution of the maximum of numbers appearing on the toss of two unbiased dice. Hence find mean of the distribution

2 Write down the probability distribution of the sum of numbers appearing on the toss of two unbiased dice. Hence find mean of the distribution

3 Find probability distribution and cumulative distribution function of X. Determine $P(X<3), P(1<X\le 2), P(0<X\le 2)$ Also find mean and variance of X if the random variable X takes the values 1,2,3&4 such that

2P(X=1) = 3P(X=2) = P(X=3) = 5P(X=4)

4 Find C, mean and variance of X, find K (where K is a +ve integer) if $P(X\le K)>1/2$, $P(1.5<X<4.5/X>2)$

Where probability function of a discrete random variable X is

$X=x_i$	0	1	2	3	4	5
$P(x_i)$	0	C	2C	2C	3C	C^2

5 A shipment of 8 microcomputers contains 3 that are defective. If a college makes a random purchase of 2 of these computers, find the probability distribution of the defective computers.

6 If X_1 has mean 5 and variance 5, X_2 has mean -2 and variance 3. If X_1 & X_2 are independent random variables find : i) $E(X_1+X_2)$, $V(X_1+X_2)$ ii) $E(2X_1+3X_2-5)$, $V(2X_1+3X_2-5)$

7 An urn contains 4 white and 3 black balls. Find the probability distribution of the number of black balls in three draws made successively with replacement from the urn.

8 A random variable x has the following probability function

X	1	2	3	4	5	6	7
P(x)	k	2k	3k	k^2	k^2+k	$2k^2$	$4k^2$

Find i) k ii) P(x<5) iii) P(x>5) iv) $P(0\le X\le 5)$ v) mean

9 Verify that $P(X=x)$ probability function of random variable X where $P(X=x)=\frac{1}{2^x}$, $x=1,2,3,\ldots.\infty$ also find mean ,varience.

10 If the following distribution of a discrete random variable X has mean =16 then find m, n and the variance of X.

X	8	12	16	20	24
P(x)	1/8	m	n	1/4	1/12

CONTINUOUS PROBABILITY DISTRIBUTION

11 A continuous random variable X has the probability density function $f(x)=k\,x^2e^{-x}$, $x\ge 0$. Find k, mean and variance

12 A continuous random variable X has the probability density function defined by $f(x)=A+Bx,\ 0\le x\le 1$. If the mean of the distribution is 1/3, find A and B

13 Let X be a continuous random variable with probability density function $f(x)=kx^2(1-x), 0\le x\le 1$ Find k , mean,mode

14 Let X be a continuous random variable with probability density function $f(x)=k\,x(1-x), 0\le x\le 1$. Find k, mean and determine a number b such that

	$P(x \le b) = P(x \ge b)$.	
15	Verify that the function given below is a distribution function $F(x) = \begin{cases} 0, & x < 0 \\ 1 - e^{-x/4}x, & x \ge 0 \end{cases}$ Also find the probabilities $P(x \le 4)$, $P(x \ge 8)$ $P(4 \le x \le 8)$	
16	Find k, $P(1 \le x \le 3)$, $\overline{X}$. if probability density function of a random variable is $f(x) = kx,\ 0 \le x \le 2$ $= 2k,\ 2 \le x \le 4$ $= 6k - kx,\ 4 \le x \le 6$	
17	A random variable x has the p.d.f. $f(x) = \dfrac{k}{1+x^2}$, $-\infty < x < \infty$. Determine k, mean, variance, & the distribution function. Also evaluate $P(x \ge 0)$.	
18	The probability density function of a random variable x is given by $f(x) = k\,e^{-x/6}, 0 < x < \infty$. Find the mean & standard deviation of x	
19	The daily consumption of electric power (in million kwh) is a random variable X with probability distribution function $f(x) = \begin{cases} k\,x\,e^{-x/3} & for \quad x \ge 0 \\ 0 & for \quad x < 0 \end{cases}$ find the value of k and the probability that on a given day the electric consumption is more than expected value	
20	Determine the constant 'a' and findmean , $P(4 \le x \le 7)$ if the distribution function of a continuous random variable is defined as $f(x) = \frac{a}{x^5}$, $2 \le x \le 10$	
21	If the distribution function of a continuous random variable is defined as follows ,find the value of 'a' ,mean , var , c.d.f. and p $(1 \le x \le 2)$ $f(x) = \begin{cases} ax, 0 \le x \le 1 \\ a, 1 \le x \le 2 \\ 3a - ax, 2 \le x \le 3 \\ 0, else\ where \end{cases}$	
22	The time a person has to wait for a bus at a bus stop is a random variable has distribution function $F(x) = 0,\ x \le 0$ $= x/3,\ 0 \le x \le 1$ $= 1/3,\ 1 \le x \le 3$ $= x/9,\ 3 \le x \le 9$ $= 1,\ \ x \ge 9$ Find the probability density function and verify that the given function is a distribution function. Find mean and variance	
23	The length of time (in minutes) a leady speaks on telephone is found to be a random variable with probability density function $f(x) = \begin{cases} A\,e^{-x/5} & for\ x \ge 0 \\ 0 & elsewhere \end{cases}$ find A and the probability that she will speak for i)more than 10 minutes, ii) less than 5 minutes, iii) between 5 and 10 minutes.	

24	For the probability density function $f(x)=\dfrac{2(b+x)}{b(a+b)} \quad -b\le x<0$ $\quad =\dfrac{2(a-x)}{a(a+b)} \quad 0\le x\le a$ check that above is a p.d.f. and find the mean	
	MATHEMATICAL EXPECTATION	
25	If a fair coin is tossed till a head appears then what is expectation of number of tosses required ?	
26	A fair coin is tossed 3 times. A person received Rs. X^2 if he get X heads. Find his expectation	
27	A and B throw a fair die for a stake of Rs.44, which is won by player who throws 6 first. If A starts first, find their expectations	
28	A & B toss fair coin alternately. One who gets a head first, wins Rs 12. A starts. Find their expectations	
29	If a coin is tossed by a player two times , he wins Rs 3 for each head and Rs 2 for each tail. Find the probability distribution table and his expectation	
30	If a player wins Rs 3 if he draws one white ball and wins Rs 2 if he draws one black ball from a bag containing 5 white and 4 black balls ,then find his expectation	
31	Three fair coins are tossed. Find the expectation and the variance of number of heads	
	BINOMIAL DISTRIBUTION:	
32	Find mean and variance of a binomial variate if if $n=6,\ 9P(x=4)=P(x=2)$	
33	Find the Binomial distribution if the mean is 5 & variance is 10/3. Find $P(x=2)$, $P(x\le 4)$	
34	The ratio of the probability of 3 successes in 5 independent trials to the probability of 2 successes in 5 independent trials is 1/4.what is the probability of 4 successes in 6 independent trials?	
35	If a probability of a defective bulb is 0.2, find the mean & the standard deviation for the distribution of defective bulbs in a lot of 1000 bulbs. What is the expectation of defective bulbs in the lot?	
36	The probability that a man aged 60 will live up to 70 is 0.65. What is the probability that out of 10 such men now at 60 (i)at least 7 will live up to 70(ii) at most 8 will live up to 70?	
37	In a precision bombing attack there is a 50% chance that any one bomb will strike the target. Two direct hits are required to destroy the target completely. How many bombs must be dropped to give at least 99% chance of destroying the target	
38	If 10% 0f the rivets produced by a machine are defective, find the probability that out of 5 randomly chosen rivets i) none will be defective ii) at the most two will be defective.	
39	Out of 800 families with 5 children each how many would you expect to have i) 3 boys & 2 girls, ii) 5 girls iii) 5 boys?	

<table>
<tr><td>40</td><td>Seven dice are thrown 729 times. How many times do you expect at least four dice to show three or five?</td><td></td></tr>
<tr><td>41</td><td>Let X, Y be two independent binomial variates with parameters $(n_1 = 6, p = 1/2)$ & $(n_2 = 4, p = 1/2)$
respectively. Evaluate $P(X+Y)=3$ & $P(X+Y)\geq 3$.</td><td></td></tr>
<tr><td>42</td><td>In a multiple choice examination there are 20 questions. Each question has 4 alternative answers following it and the student must select one correct answer. 4 marks are given for correct answer and 1 mark is deducted for wrong answer. A student must secure at least 50% of maximum possible marks to pass the examination. Suppose a student has not studied at all, so that he answers the question by guessing only. What is the probability that he will pass the examination?</td><td></td></tr>
<tr><td>43</td><td>Assume that 50% of all engineering students are good in mathematics. Determine the probabilities that among 18 engineering students (i) at least 10, (ii) at least 2 and at most 9 are good in mathematics</td><td></td></tr>
<tr><td>44</td><td>Five fair coins are tossed 3200 times; Find the frequency distribution of number of heads obtained. Also find mean and standard deviation</td><td></td></tr>
<tr><td>45</td><td>Five dice are thrown together 96 times. The number of times 4, 5 or 6 was obtained is given below.
<table><tr><td>No.of imes 4, 5 or 6 is obtained</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Freq.</td><td>1</td><td>10</td><td>24</td><td>35</td><td>18</td><td>8</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td></td></tr>
<tr><td>46</td><td>Fit a Binomial distribution to the following data.
<table><tr><td>x:</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>f:</td><td>5</td><td>18</td><td>28</td><td>12</td><td>7</td><td>6</td><td>4</td></tr></table></td><td></td></tr>
<tr><td>47</td><td>Seven coins are tossed and the number of heads obtained noted. The experiment is repeated 128 times and the following distribution is obtained
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>total</td></tr><tr><td>7</td><td>6</td><td>19</td><td>35</td><td>30</td><td>23</td><td>7</td><td>1</td><td>128</td></tr></table></td><td></td></tr>
<tr><td>48</td><td>The probability that at any moment one telephone line out of 10 will be busy is 0.2.
(i)What is the probability that 5 lines are busy?(ii)Find the expected number of busy lines and also find the probability of this number.(iii)What is the probability that all lines are busy</td><td></td></tr>
<tr><td></td><td><u>POISSON DISTRIBUTION:</u></td><td></td></tr>
<tr><td>49</td><td>If a random variable x follow Poisson distribution such that $P(x=1)=2P(x=2)$, Find the mean and the variance of the distribution. Also find $P(x=3)$.</td><td></td></tr>
<tr><td>50</td><td>A variable x follows a Poisson distribution with variance 3. Calculate i) $P(x=2)$, ii) $P(x\geq 4)$.</td><td></td></tr>
<tr><td>60</td><td>If X, Y are independent Poisson variates such that $P(x=1)=P(x=2)$ & $P(y=2)=P(y=3)$ find the variance of $2X-3Y$.</td><td></td></tr>
<tr><td>61</td><td>An insurance company found that only 0.01% of the population is involved in a certain type of accident each year. If its 1000 policyholders were randomly selected from the population, what is the probability that no more than two of its clients are involved in such accident next year?</td><td></td></tr>
<tr><td>62</td><td>Find the probability that (i)at most 4 defective bulbs(ii) no defective bulbs will</td><td></td></tr>
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<tr><td></td><td>be found in a box of 200 bulbs if it is known that 2 percent of the bulbs are defective</td><td></td></tr>
<tr><td>63</td><td>Between the hours of 2 & 4 P.M. the average number of phone calls per minute coming in to the switchboard of a company is 2.5, find the probability that during a particular minute there will be i) no phone calls at all ii) more than 6 calls.</td><td></td></tr>
<tr><td>64</td><td>It is known that the probability of an item produced by a certain machine will be defective is 0.05. If the produced item are send to the market in packets of 20, find the number of packets containing i)at least ii) exactly & iii)at most 2 defective items in a consignment of 1000 packets using Binomial distribution & Poisson approximation to the Binomial distribution</td><td></td></tr>
<tr><td>65</td><td>A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5 Calculate the proportion of days on which i) neither car is used, ii) some demand is refused</td><td></td></tr>
<tr><td>66</td><td>Accidents occur on a particular stretch of highway at an average rate 3 per week. What is the probability that there will be(i) exactly two accidents (ii) atmost two accidents in a given week?</td><td></td></tr>
<tr><td>67</td><td>A firm produces articles, 0.1 percent of which one defective. It packs them in cases containing 500 articles. If a wholesaler purchases 100 such cases how many cases can be expected i) to be free from defective ii) to have one defective?</td><td></td></tr>
<tr><td>68</td><td>A manufacturer finds that the average demand per day for the mechanic to repair his new production is 1.5 over a period of one year & the demand per day is distributed as Poisson distribution. If he employs two mechanics on how many days in a year i) both mechanics would be free ii) some demand is refused?</td><td></td></tr>
<tr><td>69</td><td>In a certain factory producing certain articles the probability that an article is defective is 1/500. The articles are supplied in packets of 20. Find approximately the number of packets containing no defective, one defective, two defective in a consignment of 20000 packets</td><td></td></tr>
<tr><td>70</td><td>If the mean of the Poisson distribution is 4, find $P(m-2\sigma < x < m+2\sigma)$</td><td></td></tr>
<tr><td>71</td><td>If 2 percent bulbs are known to be defective bulbs, find the probability that in a lot of 20 bulbs, there will be 2 or 3 defective bulbs using i) Binomial distribution, ii) Poisson distribution.</td><td></td></tr>
<tr><td>72</td><td>If X_1, X_2, X_3 are three independent Poisson variates with parameters $m_1 = 1,\ m_2 = 2,\ m_3 = 3$ respectively, find $P[(X_1 + X_2 + X_3) \geq 3]$</td><td></td></tr>
<tr><td>73</td><td>Fit a Poisson distribution If the following mistakes per page were observed in a book
<table>
<tr><td>No. of mistakes</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>Total</td></tr>
<tr><td>No. of pages</td><td>211</td><td>90</td><td>19</td><td>5</td><td>0</td><td>325</td></tr>
</table></td><td></td></tr>
<tr><td>74</td><td>Fit a Poisson distribution to the following data.
<table>
<tr><td>x:</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Total</td></tr>
<tr><td>f:</td><td>142</td><td>156</td><td>69</td><td>27</td><td>5</td><td>1</td><td>400</td></tr>
</table></td><td></td></tr>
<tr><td>75</td><td>Fit the data to Poisson distribution
<table>
<tr><td>No. of mistakes</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>Total</td></tr>
<tr><td>No. of pages</td><td>123</td><td>59</td><td>14</td><td>3</td><td>1</td><td>200</td></tr>
</table></td><td></td></tr>
</table>

	NORMAL DISTRIBUTION:	
76	If x is normally distributed with mean & standard deviation 4, find i) P (5 $\leq x \leq 10$), ii) P(x≥ 15), iii) P (10$\leq x \leq 15$), iv) P (x≤ 5)	
77	Find-i) $P\left(\lvert x-14\rvert<1\right)$, ii) $P\left(5\leq x\leq 18\right)$, iii) $P\left(x\leq 12\right)$ If x is a normal variate with mean 10 and standard deviation 4	
78	For a normal variate with mean 2.5 and standard deviation 3.5 find the probability that- i) $P\left(2\leq x\leq 4.5\right)$, ii) $P\left(-1.5\leq x\leq 5.5\right)$	
79	A manufacturer knows from his experience that the resistance of resistor he produces is normal with $\mu=100$ ohms & standard deviation $\sigma=2$ ohms. What percentage of register will have resistance between 98 ohms & 102 ohms?	
80	A normal distribution has mean 5 & standard deviation 3, what is the probability that the deviation from the mean of an item taken at random will be negative?	
81	The daily sales of a firm are normally distributed with mean Rs 8000 & variance of Rs 10,000, i) what is the probability that on certain day the sales will be less than RS 8210? ii) What is % of days on which the sales will be between Rs 8100 & Rs8200?	
82	The mean height of soldiers is 62.22" with variance 10.8". Find the expected number of soldiers in a regiment of 1000 whose height will be more than 6 feet.	
83	Assuming that the diameters of 1000 brass plugs taken consecutively from a normal distribution with mean 0.7517 cm. & standard deviation 0.0020 cm. How many plugs are likely to be rejected if the approved diameter is 0.752 ± 0.004	
84	The marks of 1000 students of a university are found to be normally distributed with mean 70 & standard deviation 5.Estimate the numbers of student whose marks will be i) between 60 & 75, ii) more than 75, iii) less than 68.	
85	The life of army shoes is normally distributed with mean 8 months & standard deviation 2 months. If 5000 pairs were issued, how many pairs would be expected to need replacement after 12 months?	
86	In an intelligence test administered to 1000 students the average was 42 & standard deviation was 24.Find the numbers of students i) exceeding 50, ii) between 30&54, iii) the least score of top 100 students.	
87	The height of 1000 soldiers in a regiment are distributed normally with mean 172 cm and standard deviation 5 cm. how many soldiers have height > 180 cm.	
88	The income distribution of workers in a certain factory was found to be normal with mean of Rs.500 & standard deviation equal to Rs.50.There were 228 persons above Rs 600. How many persons were there in all?	
89	If the actual amount of coffee which a filling machine puts into 6 ounce jars is a random variable having normal distribution with standard deviation 0.05 ounce and if only 3% of the jars are contain less than 6 ounce of coffee what must be the mean fill of these jars?	
90	The customer account (A/c) at a certain departmental store have an average balance of Rs.480 and S.D. of Rs.160. Determine i) what proportion of A/c is over 600. ii) What proportion of A/c is between Rs. 400 and Rs. 600 and below 240?	

91	In an examination marks obtained by students in Mathematics, Physics and Chemistry are normally distributed with means 51, 53 and 46 with standard deviation 15, 12, 16 respectively. Find the probability of securing total marks (i) 180 0r above, (ii) 90 or below.	
92	If the height of 500 students is normally distributed with mean 68 inches and standard deviation 4 inches. Find the expected number of students having heights: i) greater than 72 inches, ii) less than 62 inches, iii) between 65 & 71 inches	
93	In a distribution exactly normal 7% of items are under 35 & 89% are under 63.What are the mean & standard deviation.	
94	The distribution of marks in a certain examination was found to be normal with 23% of the candidates scoring above 60 marks & 21% candidates scoring below 40. Find the mean & standard deviation of the distribution	
95	The probability that the marks of a student chosen at random will exceed 50 (out of 100) is 0.25. Find in two different ways, the probability that out of 100 students of this group 25 to 30 will have marks more than 50.	
96	The incomes of a group of 10,000 persons were found to be normally distributed with mean Rs.520 and S.D. Rs.60. Find i) the number of persons having incomes between Rs. 400 and Rs.550, ii)the lowest income of the richest 500.	
97	The mean yield for one acre plot is 662 Kg with S.D. 32 Kg. Assuming normal distribution how many one acre plots in a batch of 1000 plots would expect to have yield i) over 700 Kg, ii) below 650 Kg, iii) What is lowest yield of the best 100 plots?	
98	If X_1 and X_2 are two independent random variates with means 30 and 25 and variances 16 and 12 and if $Y = 3X_1 - 2X_2,\ find\ P(60 \le Y \le 80)$	
99	The marks obtained by students in a certain examination follow a normal distribution with a mean 45 and standard deviation 10. If 1000 students appeared at an examination. Calculate the number of students scoring i) less than 40 marks, ii) more than 60 marks	
100	The marks obtained by number of students in a certain subject are approximately normally distribted with mean 65 and SD 5. If 3 students are selected at random from this group, what is the probability that at least one of them would have scored above 75%.	
101	In a large institution 2.28% of employees receive income below Rs 4500 and 15.87% of employees receive income above 7500 p.m. assuming the income follows normal distribution. Find the mean and S.D. of the distribution	
102	The probability that an electronic component will fail in less than 1200 hours of continuous use is 0.25 Use Normal approximations to find the probability that among 200 such components exactly 45 will fail in less than 1200 hours of continuous use	
103	Using normal distribution, find the probability of getting 55 heads in the toss of 100 fair coins.	
104	Of a large group of men 5% are under 60 inches in height & 40% are between 60 & 65 inches. Assuming a normal distribution, find the mean & standard deviation of the distribution	
105	In an examination marks obtained by students in Mathematics, Physics and Chemistry are normally distributed with means 51, 53 and 46 with standard deviation 15, 12, 16 respectively. Find the probability of securing total marks (i)	

	180 0r above, (ii) 90 or below.	
106	A geneticist working for a seed company develops a new carrot for growing in heavy clay soil. After measuring 5000 of these carrots it can be said that carrot length X is normally distributed with mean $\mu = 11.5\, cm$ & $\sigma = 1.15\, cm$. What is the probability that X will take on a value in the interval $10 \le x \le 13$?	
107	A normal population has a mean of 0.1 and S.D. of 2.1. Find the probability that the mean of a sample size 900 drawn from this population will be negative.	
108	Monthly salary in an organization is normally distributed with mean Rs 3000/ and standard deviation of Rs 250/. What should be the minimum salary of a worker in this organization , so that he belongs to top 5% workers.	
	Uniform Distribution	
109	Suppose that for a certain company , the conference time, X has a uniform distribution over interval (0,5)hrs (1) what is pdf of X (2) . Find the probability that any conference lasts atleast 3hrs (3) Find the probability that any conference lasts for atleast 2hrs ,but does not exceed more than 3.5 hrs	
110	X is Uniform Distribution over the range (a,b) such that mean is 15/2 and variance is 25/12 .(i) Find value of a,b (ii) Find P(5< X<7)	
111	On a route from railway station to college ,every 20 minutes ,ther is a bus .A student arrives at bus stop and waits for a bus. His waiting time till bus arrives is uniform over the interval (0,20) On one fine day what is probability that his waiting time is (i) less than 5 minutes (ii) between 7 minutes to 15 minutes (iii) more than 10 minutes	
112	X is Uniform Distribution over the range (a,a+1) , find value of a, such that P(0.25<X<a)=0.25	
113	X is Uniform Distribution with mean 1 and variance 4/3 Find P(X<0)	
114	X is Uniform Distribution over the range (2,b) such that P(3<X<6)=0.3 ,find mean and variance of X	
	Exponential distribution	
115	The amount of time that a watch will run without having to be reset is a random variable having an exponential distribution with mean 120 days. Find the probability that such a watch will (i) have to be set in less than 24 days (ii) not have to reset in at least 180 days.	
116	The mileage which car owners get with a certain kind of radial tire is a random variable having an exponential distribution with mean40,000km. Find the probability that one of these tires will last (i) atleast 20,000km (ii) atmost 20,000km	
117	The time (in hours) required to repair a machine is exponentially distributed with parameter λ=0.5. Find the probability that the repair time exceeds 2 Hrs	
118	If X is exponentially distributed prove that X exceeds it's expected value is less than 0.5	
119	If X is exponentially distributed prove that P((x>s+t) / (x>s)) for any s,t >0	
120	The daily consumption of milk in excess of 20 klitres in a town is approximately exponentially distributed with parameter 1/3000 . The town has daily stock of 35 kL. Find the probability that of 2 days selected at random the stock is sufficient for both days.	
	Joint Probability	
121	Three balls are drawn at random without replacement from a box containing 2 white,3 red and 4 black balls .If X denotes the number of white balls drawn and Y denotes the number of red balls drawn find joint probability distribution.	

122 The joint probability distribution function of (X,Y) is given by p(x,y)=k(2x+3y),x=0,1,2& y=1,2,3.Findall the marginal and conditional probability distributions also find the probability distribution of X+Y.

123 The joint probability distribution function of (X,Y) is given by $\mathrm{f}(\mathrm{x},\mathrm{y}) = \frac{\mathrm{x}^2}{8} + \mathrm{xy}^2$ $0 \leq x \leq 2$, $0 \leq y \leq 1$ Compute $P(X > 1), P(Y < 0.5), P(X > 1 \mid Y < 0.5) P(Y < 0.5 \mid X > 1), P(X < Y), P(X + Y \leq 1)$

124 The joint probability distribution function of (X,Y) is given by $\mathrm{f}(\mathrm{x},\mathrm{y}) = \frac{1}{2\mathrm{K}^2 \pi} \mathrm{e}^{-\frac{(\mathrm{x}^2+\mathrm{y}^2)}{2\mathrm{K}^2}}$ $-\infty < x, y < \infty$, Find $P(X^2 + Y^2 \leq a^2)$

125 Given $f_{xy}(x,y) = cx(x-y), 0 < x < 2, -x < y < x$ & 0 elsewhere
(1)Evaluate c (2) find $f_x(x)$ (3) find $f_y(y)$ (4) find $f_{y/x}(y/x)$

126 The joint probability distribution function of (X,Y) is given by

X	Y					
	1	2	3	4	5	6
0	0	0	1/32	2/32	2/32	3/32
1	1/6	1/6	1/8	1/8	1/8	1/8
2	1/32	1/32	1/64	1/64	0	2/64

$P(X \leq 1), P(Y \leq 3), P(X \leq 1 \mid Y \leq 3) P(Y \leq 3 \mid X \leq 1), P(X < Y), P(X + Y \leq 4)$

127 The joint probability distribution function of (X,Y) is given by $\mathrm{f}(\mathrm{x},\mathrm{y}) = \mathrm{kxye}^{-(\mathrm{x}^2+\mathrm{y}^2)}$ x>0 ,y>0 Find value of k & prove that X & Y are independent

128 The joint probability distribution function of (X,Y) is given by

X	Y		
	1	2	3
0	3K	6K	9K
1	5K	8K	11K
2	7K	10K	13K

Find value of k , Findall the marginal and conditional probability distributions

Bayes Theorem

129 A man speaks truth 3 times out of 5 times . When a die is thrown , he states that it gave an ace . Using Bayes theorem find the probability that this event has actually happened ?

130 Three factories A,B,C produce 40%,40% & 20% of the total production of an item .Out of their production 15%,10% & 2% are defective.An item is chosen at random and found to be defective . Using Bayes theorem find the probability that it was produced by the factory A.

131 A bag contains 8 red balls and 4 black balls and another bag contains 6 red balls and 5 black balls. One ball is transferred from the first bag to the second bag then a ball is drawn from the second bag . If this ball happens to be red ,find the probability that a black ball was transferred

132 A lot of IC chips is known to contain 4% defective chips, each chip is tested before delivery but the test is not reliable .It is known that p(Tester says the chip is defective / the chip is actually defective) = 0.97 and p(Tester says the chip is good / the chip is actually good) = 0.98 If a tested chip is declared defective by the tester . find the probability that it is actually defective

133 An urn contains 5 white balls and 4 black balls and another urn contains 6

	white balls and 4 black balls. One ball is transferred from the first urn to the second urn then a ball is drawn from the second urn . If this ball happens to be white ,find the probability that a black ball was transferred	
134	Three machines A,B,C produce respectively 60%,30% & 10% of the total number of items of a factory. The percentage of defective outputs of these machines are respectively 2%,3% & 4%.An item is chosen at random and found to be defective . Using Bayes theorem findthe probability that it was produced by the factory A	
135	In a certain college 4% of the boys and 1% of the girls are taller than 1.8 m. Furthermore 60% of the students are girls Now if a student is selected at random and taller than 1.8 m what is probability that the student is girl ?	
136	A box contains 3 coins , first coin is fair , second coin is two headed , third coin is weighted so that the probability of a head appearing is 1/3 . A coin is selected at random from the box and tossed (i) find the probability that head appears (ii) If head appears what is probability that it comes on first coin?	
137	Box A contains 9 cards numbered from 1 to 9 Box B contains 5 cards numbered from 1 to 5. A box is selected at random and a card is drawn. If the number is even what is probability that the card comes from box A ?	
138	For a certain binary communication channel , the probability that a transmitted ‘0’ is received as a ‘0’ is 0.95 and the probability that a transmitted ‘1’ is received as a ‘1’ is 0.90 If the probability that a ‘0’ is transmitted is 0.4 what is probability that ‘1’ was transmitted given that ‘1’ was received ?	
139	A bag contains 4 red balls , the colours of which are not known. Two balls were drawn from the bag and they were found to be red . what is probability that all balls are red ?	